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ABSTRACT

As part of a longitudinal study of Piute Indian children being conducted by Children's Hospital, Los Angeles, 3-day dietary-intake records of 23 Piute Indian preschool children in Inyo County, California, were analyzed according to 4 food groups. As reported, results indicated that 5 or 6 food groups should be used if intake results of vitamins C and A are being studied and that, in general, diets of Piute Indian preschool children were adequate in calories, protein, B vitamins, and calcium; ascorbic acid and iron were most frequently inadequate. (JB)

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A THREE DAY DIETARY SURVEY OF PIUTE PRESCHOOL<sup>1</sup>  
CHILDREN IN INYO COUNTY, CALIF.

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As part of a longitudinal study of Piute Indian children being conducted by Children's Hospital, Los Angeles, three day dietary intake records of 23 Piute Indian preschool children in Inyo County, Calif. were analyzed. The subjects included 11 boys and 12 girls. Two children were between 1 and 2 years, two between 2 and 3 years and nineteen 3 through 4 years.

Dietary questionnaires with detailed instructions were given to the parents of the children by the Indian Health Aides in Inyo County. These were supplemented by verbal instructions from the public health nurse and by written instructions from the nutritionist from Children's Hospital, Los Angeles.

The average caloric intake from protein for these children was 18%, from fat 40%, and from carbohydrates 42%. The mean intake of nutrients for the nineteen 3 and 4 year olds are shown in Table I.

The percent of the 1968 Recommended Dietary Allowances were calculated for each child. The number of children meeting various levels of the 1968 RDA are shown in Table II. The percent of the 1968 RDA met for calories ranged from 65% to 150%. Two children (9%) had intakes between 65-74% of the RDA. The protein intake was adequate for the children in all age groups with intakes ranging from 132% to 326% of RDA.

The lowest intake for riboflavin was 95% of RDA for one child. Two children (9%) had niacin intakes less than 75% of RDA. However the high intake of protein most likely provided sufficient niacin equivalents.

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Only one child, age 3 years, had a dietary intake of thiamin below 75% of RDA. This child's intake provided 46 mg/1000 Kcal which is considered adequate.

Four children (17%) had vitamin A intakes less than 75% of RDA. However when intakes were calculated on the basis of body weight these children were above the 35 I.U./kg considered low by Owen and Kram.

The calcium intakes ranged from 34% to 150% of the 1968 RDA. Of the two children (9%) meeting less than 75% of RDA one was a two year old who had an intake of 400 mg (50% of RDA) which is a borderline low intake by the standards of Owen and Kram. The other child had 270 mg or 34% of RDA which was on the borderline of deficiency, 250 mg, by the standards of Owen. This child's height was below the 10th percentile for his age.

The ascorbic acid intake of 5 children (22%) was below 75% of RDA. Of these two children, age 3 years, had intakes of 8 and 10 mg, respectively, less than 25% of the RDA, and the other three had intakes between 26 and 50% of the RDA of 40 mg.

Iron intakes ranged from 45% to 177% of the 1968 RDA. Ten children (43%) were below 75% of RDA. The RDA for children ages 1 and 2 years is 15 mg while that for those 3 and 4 years is 10 mg. Three of the 4 children under 3 years of age had intakes of 7 mg/day or less than 50% of the RDA. Owen considers an intake of 8 mg/day "low" for children 1 to 5 years of age.

Eight children (35%) met 75% of all nutrients. See Table III. Nine children (39%) had diets which met less than 75% of the RDA for one nutrient, two children (9%) had diets which provided less than 75% of the RDA for two nutrients, three children (13%) received less than 75% of the RDA for three nutrients, and one child (4%) had a diet which provided less than 75% of the RDA for five nutrients (kilocalories, iron, niacin and

and vitamins A and C).

When intakes were compared to the criteria of Owen and Kram nine children (39%) had low caloric intakes, one (4%) had low calcium intake, 13 (52%) had low iron intakes and 3 (13%) had low ascorbic acid intakes. See Table IV.

Heights and weights were recorded for the children. Eight of the 11 females and 3 of the 10 males had height percentiles that were 40 percentiles below their weight percentiles. The children appeared short and stocky.

The diet records of 25 children were also examined by the four food groups. Table V shows how many met the recommended number of servings. None of the children met the recommended servings of all 4 basic food groups, 6 (24%) met the recommended number of servings for 3 food groups, 13 (52%) met the recommended number of servings for 2 groups, and 6 (24%) met the recommended number of servings for only one food group. Twenty-three (92%) of the children had two or more meat servings. The other two children (8%) had more than the recommended number of servings of the milk group. Seven (28%) had three or more servings of the milk group while 13 (52%) averaged 2.0-2.9 servings. Of the other five children, one 4 year old had an average of 0.6 servings of the milk group each day for the three days. This was the same child whose dietary intake of calcium was 34% of RDA. The other four children had averages of 1.3, 1.3, 1.6, and 1.6 servings/ day of milk for the 3 days recorded.

In Table VI the number of servings per day of fruits and vegetables eaten by these children is shown. Fourteen (56%) had 4 or more servings of fruits and vegetables. Of these seven had 5 or more servings. Two of these had an average of 6 servings per day. Seven (28%) had an

average of 3.0-3.9 servings. Four (16%) had less than 3 servings. Three of these averaged 2.6 servings per day and one child averaged only one serving of fruits and vegetables per day.

Of the four food groups the bread and cereal group was met the least frequently. Table VII shows the number of servings of bread and cereal eaten. Only two children averaged 4 or more servings per day while 14 (56%) had 3.0-3.9 servings.

The questionnaire contained questions concerning frequency various foods were eaten. Table VIII summarizes the means of the frequencies mothers reported that they thought their children ate each food group. The mothers thought their children ate the bread group more frequently than the diet records indicated and the vegetable and fruit group less often than indicated in the diet records. The mothers reported that they thought their children averaged one serving of citrus per day. See Table IX.

The frequency of snacks are shown in Table X. The questionnaire indicated that two out of 14 children (14%) never had between meal snacks while 6 (43%) had 3 snacks, mid a.m., mid p.m., and p.m., regularly. Two children (14%) had 2 snacks regularly, two (14%) frequently had 3 snacks, while two (14%) had 2 snacks infrequently.

When the kinds of foods eaten as snacks were examined it was found that these were not just empty calories. These are shown in Table XI. In the dairy group there were 1.3 servings per day, in the meat group 0.7 servings per day, in the fruit and vegetable group 1 serving per day, and in the bread and cereal groups 2.4 servings per day. The snacks in the fruit group were mostly fruit juices while those in the cereal group were approximately 60% sandwiches and crackers and 40% cookies, cake, doughnuts and pies.

This study shows that analyzing diets by the four food groups indicated in general the same dietary inadequacies as the more complicated calculations of diet intakes. Where information is needed for community nutrition education projects, diet records analyzed by food groups and food frequency questionnaires would give information rapidly that would be current. Moreover when analyzed by food groups the educator then knows what food groups to emphasize.

However the use of four food groups would not indicate whether vitamin C and vitamin A intakes were sufficient. Six food groups or five food groups instead of the present four would indicate better whether diets were adequate. Likewise the use of six food groups when doing nutrition education work would place more emphasis on vitamin C and vitamin A.

This study would indicate that in general diets of Piute Indian preschool children in Inyo County are adequate in calories, protein, B vitamins and calcium. However, as with many different groups, iron and ascorbic acid intake were most frequently inadequate.

Table I

Mean Nutrient Intake for Nineteen  
Piute Indian Preschool Children  
Three and Four Years Old

| Nutrient          | Age<br>Group * | 1968<br>RDA     | Mean | S.D.       | Range     |
|-------------------|----------------|-----------------|------|------------|-----------|
| Kilocalories      | 3.0-3.9        | 1400            | 1364 | $\pm 356$  | 912-2252  |
|                   | 4.0-4.9        | 1600            | 1488 | $\pm 209$  | 1218-1877 |
| Protein, g        | 3.0-4.9        | 30              | 65   | $\pm 13$   | 39-98     |
| Calcium, mg       | 3.0-4.9        | 800             | 830  | $\pm 200$  | 270-1200  |
| Iron, mg          | 3.0-4.9        | 10              | 8.7  | $\pm 2.7$  | 5.6-17.7  |
| Ascorbic acid, mg | 3.0-4.9        | 40              | 55   | $\pm 38$   | 8-154     |
| Vitamin A, IU     | 3.0-4.9        | 2500            | 3040 | $\pm 1474$ | 1153-6054 |
| Thiamin, mg       | 3.0-3.9        | 0.7             | 0.92 | $\pm 0.34$ | 0.52-1.74 |
|                   | 4.0-4.9        | 0.8             | 0.98 | $\pm 0.14$ | 0.75-1.15 |
| Riboflavin, mg    | 3.0-3.9        | 0.8             | 1.6  | $\pm 0.59$ | 1.14-3.37 |
|                   | 4.0-4.9        | 0.9             | 1.46 | $\pm 0.27$ | 0.86-1.75 |
| Niacin, mg        | 3.0-3.9        | 9 <sup>#</sup>  | 9.6  | $\pm 3.5$  | 4.7-17.5  |
|                   | 4.0-4.9        | 11 <sup>#</sup> | 11.3 | $\pm 1.2$  | 9.7-13.4  |

\*N = 11 for age group 3.0-3.9

N = 8 for age group 4.0-4.9

# RDA is expressed in niacin equivalents

Table II

Percentage of 23 Piute Preschoolers Meeting Various Levels of 1968 RDA

|               | % of RDA |     |          |    |         |    |        |    |       |    |
|---------------|----------|-----|----------|----|---------|----|--------|----|-------|----|
|               | > 125%   |     | 101-125% |    | 75-100% |    | 51-75% |    | < 50% |    |
|               | N        | %   | N        | %  | N       | %  | N      | %  | N     | %  |
| Kilocalories  | 4        | 17  | 6        | 26 | 11      | 48 | 2      | 9  | 0     | 0  |
| Protein       | 23       | 100 | 0        | 0  | 0       | 0  | 0      | 0  | 0     | 0  |
| Calcium       | 4        | 17  | 8        | 35 | 9       | 39 | 1      | 4  | 1     | 4  |
| Riboflavin    | 22       | 96  | 0        | 0  | 1       | 4  | 0      | 0  | 0     | 0  |
| Thiamin       | 11       | 48  | 7        | 30 | 4       | 17 | 1      | 4  | 0     | 0  |
| Niacin        | 6        | 26  | 9        | 39 | 6       | 26 | 2      | 9  | 0     | 0  |
| Vitamin A     | 8        | 35  | 4        | 17 | 7       | 30 | 3      | 13 | 1     | 4  |
| Ascorbic Acid | 11       | 48  | 4        | 17 | 3       | 13 | 0      | 0  | 5     | 22 |
| Iron          | 1        | 4   | 3        | 13 | 9       | 39 | 7      | 30 | 3     | 13 |

Table II

Percentage of 23 Piute Preschoolers Meeting Various Levels of 1968 RDA

|               | % of RDA |     |          |    |         |    |        |    |      |    |
|---------------|----------|-----|----------|----|---------|----|--------|----|------|----|
|               | >125%    |     | 101-125% |    | 75-100% |    | 51-75% |    | <50% |    |
|               | N        | %   | N        | %  | N       | %  | N      | %  | N    | %  |
| Kilocalories  | 4        | 17  | 6        | 26 | 11      | 48 | 2      | 9  | 0    | 0  |
| Protein       | 23       | 100 | 0        | 0  | 0       | 0  | 0      | 0  | 0    | 0  |
| Calcium       | 4        | 17  | 8        | 35 | 9       | 39 | 1      | 4  | 1    | 4  |
| Riboflavin    | 22       | 96  | 0        | 0  | 1       | 4  | 0      | 0  | 0    | 0  |
| Thiamin       | 11       | 48  | 7        | 30 | 4       | 17 | 1      | 4  | 0    | 0  |
| Niacin        | 6        | 26  | 9        | 39 | 6       | 26 | 2      | 9  | 0    | 0  |
| Vitamin A     | 8        | 35  | 4        | 17 | 7       | 30 | 3      | 13 | 1    | 4  |
| Ascorbic Acid | 11       | 48  | 4        | 17 | 3       | 13 | 0      | 0  | 5    | 22 |
| Iron          | 1        | 4   | 3        | 13 | 9       | 39 | 7      | 30 | 3    | 13 |

Table III

Percentage of Twenty-Three  
Piute Preschool Children Meeting 75% of RDA

|                     | N | %  |
|---------------------|---|----|
| All nutrients       | 8 | 35 |
| All but 1 nutrient  | 9 | 39 |
| All but 2 nutrients | 2 | 9  |
| All but 3 nutrients | 3 | 13 |
| All but 5 nutrients | 1 | 4  |

Table IV

Percentage of Twenty-Three  
Piute Preschool Children Low by Criteria of Owen

| Nutrient      | Criteria          | N  | %  |
|---------------|-------------------|----|----|
| Kilocalories  | <75/kg/day        | 9  | 39 |
| Protein       | <1.5/kg/day       | 0  | 0  |
| Calcium       | <400 mg/day       | 1  | 4  |
| Iron          | <8 mg/day         | 13 | 52 |
| Ascorbic acid | <15 mg/day        | 3  | 13 |
| Vitamin A     | <35 I.U./kg/day   | 0  | 0  |
| Thiamin       | <0.3 mg/1000 kcal | 0  | 0  |
| Riboflavin    | <0.4 mg/1000 kcal | 0  | 0  |

Table V

Percentage of Twenty-Five  
Piute Preschool Children  
Meeting Basic Four Food Groups

|                           | N  | %    |
|---------------------------|----|------|
| 4 food groups             | 0  | 0    |
| 3 food groups             | 6  | 24   |
| 2 food groups             | 13 | 52   |
| 1 food group only         | 6  | 24   |
| Meat group                | 23 | 92*  |
| Milk group                | 20 | 80** |
| Fruit and vegetable group | 14 | 56   |
| Bread and cereal group    | 2  | 8    |

\*The two who did not have 2 servings  
had more than recommended servings  
of milk

\*\*7 had 3 or more servings

Table VI

Servings Fruits-Vegetables Eaten Per Day  
By Twenty-Five Piute Preschool Children

| Number servings | Children |    |
|-----------------|----------|----|
|                 | N        | %  |
| 6               | 2        | 8  |
| 5.0-5.9         | 5        | 20 |
| 4.0-4.9         | 7        | 28 |
| 3.0-3.9         | 7        | 28 |
| 2.0-2.9         | 3        | 12 |
| 1.0-1.9         | 1        | 4  |

Table VII

Servings Bread-Cereals Eaten Per Day  
By Twenty-Five Piute Preschool Children

| Number of servings | Children |    |
|--------------------|----------|----|
|                    | N        | %  |
| 5.3                | 1        | 4  |
| 4                  | 1        | 4  |
| 3.0-3.9            | 14       | 56 |
| 2.0-2.9            | 7        | 28 |
| 1.0-1.9            | 2        | 8  |

Table X

Frequency of Snacks for  
Fourteen Piute Preschool Children

|                           | Children |    |
|---------------------------|----------|----|
|                           | N        | %  |
| 0 snacks any day          | 2        | 14 |
| 3 snacks every day        | 6        | 43 |
| 2 snacks every day        | 2        | 14 |
| 3 snacks almost every day | 2        | 14 |
| 2 snacks infrequently     | 2        | 14 |

Table XI

Contribution of Snacks to Diets of  
Fourteen Piute Preschool Children

|                       | Servings/day |
|-----------------------|--------------|
| Dairy group           | 1.3          |
| Meat group            | 0.7          |
| Bread-cereal group    | 2.4          |
| Fruit-vegetable group | 1.0          |